Input Name	Inputs	Support Material
Distribution Structure Inputs (contd.)		
Buned Installation/foot		Trenching and plowing of cable are much less expensive methods of creating paths for the placing of cable underground than is trenching for cable in conduit, which generally involves penetrating pavement and restoring pavement as well as ea-- excavation and backfill The cost per foot of buried installation varies by density class based on anticipated incidence of features/obstructions as density increases (pipe jacking under obstructions such as roads and driveways, for example) The trenching figures for buried installation represent reasonable estimates for continuous common earth trenching. Published estimates that support the input values for buried installation costs are included in Exhibit 2 hereto
-5	$2.00	
5-200	$2.00	
200-650	$2.00	
650-850	$3.00	
850-2550	$3.00	
2550+	$20.00	

Input Name	Inputs	Support Material
Distribution Structure Inputs (contd.)		
Conduit Installation/foot		
0-5	$25.00	Trenching for cable in conduit is a more expensive method of creating paths for the placing of cable underground than is trenching and [illegible] pavement as well as earth excavation and backfill
5-200	$25.00	
200-650	$25.00	
650-850	$25.00	
850-2550	$45.00	
2550-	[illegible]	
		[illegible] underground [illegible] class [illegible] of [illegible]
		The trenching figures for conduit installation represent reasonable estimates for continuous common earth trenching

Input Name	Inputs	Support Material
Distribution Structure Inputs (contd.)		
Pole spacing, feet	150	Pole spacing is based on field experience of 35 poles per mile.
Pole investment	$450	The Input value represents a conservative installed cost for a 35' Class 4, treated southern pine pole. The cost is split approximately 40/60 material to labor and assumes installation by high production machinery such as power auger trucks
Conduit investment per foot	$1.00	The Input value represents a conservative material cost per foot of duct for 4" PVC
Manhole investment, per manhole	$3,000	The Input value represents the installed cost of a prefabricated concrete manhole per industry pricing. Exhibit 3 provides a representative estimate of a typical manhole.
Buried cable armoring multiplier	1.1	The armoring multiplier is based on field experience for DEPIC filled ASP sheath cable for all buried cable. A multiplier (rather than an additional cost per foot) is appropriate, since armoring cost is a function of cable circumference, which is a function of number of pairs, which is directly correlated with cost

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Copper Feeder Structure Inputs		
Aerial Fraction		
0-5	0.5	The three structure categories of Aerial, Buried and Underground, are assumed to reflect an equal distribution in the lowest three density [illegible] that will exit the [illegible] and that [illegible] underground [illegible]
5-200	0.5	
200-650	0.5	
650-850	0.4	
850-2550	[illegible]	
2550+	[illegible]	
Buried Fraction		
0-5	[illegible]	[illegible] reflects [illegible] generally [illegible] areas as previously discussed. This assumption is generally consistent with the assumption in BCM
5-200	[illegible]	
200-650	[illegible]	
650-850	[illegible]	
850-2550	[illegible]	
2550+	[illegible]	
Underground Fraction		
0-5	[illegible]	
5-200	0.05	
200-650	0.05	
650-850	0.2	
850-2550	0.8	
2550+	0.9	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Copper Feeder Structure Inputs (contd.)		
Buried Installation/foot		
0-5	$2.00	Trenching and plowing of cable are less expensive methods of creating paths for the placing of cable underground than is trenching for cable in conduit which generally involves penetrating pavement and restoring pavement as well as earth excavation and backfill
5-200	$2.00	The cost per foot of buried installation varies by density class based on anticipated higher incidence of features/obstructions as density increases. For higher density areas this includes items such as pipe jacking under obstructions such as roads and driveways
200-650	$2.00	The trenching figures for buried installation represent reasonable estimates for continuous common earth trenching. Published estimates that support the input values for buried installation costs are included as Exhibit 2.
650-850	$3.00	
850-2550	$3.00	
2550+	[illegible]	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY September 26, 1996

Input Name	Inputs	Support Material
Copper Feeder Structure Inputs (contd.)		
Conduit Installation/foot		Trenching for cable in conduit is a more expensive method of creating paths for the placing of cable underground than is trenching and plowing of cable, which generally involves penetrating pavement and restoring pavement as well as earth excavation and backfill. The cost per foot of underground installation varies by density class based on anticipated higher incidence of features/obstructions as density increases. The trenching figures for conduit installation represent reasonable estimates for continuous common earth trenching.
0-5	$25.00	
5-200	$25 00	
200-650	$25 00	
650-850	$25 00	
850-2550	$45 00	
2550+	$75 00	
Manhole Spacing ft		Manhole spacing is driven by the distance required between manholes to provide for splicing of the longest length of the largest diameter cable which is DCTZ 4,200 pair of 26 gauge cable 3.35 inches in diameter and 913 feet long off a 420 reel per Bellcore System Practice 626-101-005. The higher density zones reflect reduced distances between manholes to provide transition points for changing types of sheaths and increased number of branch points.
0-5	800	
5-200	800	
200-650	800	
650-850	800	
850-2550	600	
2550+	400	

Input Name	Inputs	Support Material
Copper Feeder Structure Inputs (contd.)		
Pole spacing, feet	150	Pole spacing is based on field experience of 35 poles per mile
Pole investment	$450	The input value represents a conservative installed cost for a 35' Class 4, treated southern pine pole. The cost is split approximately 40/60 material to labor and assumes installation by high production machinery such as power auger trucks.
Conduit investment per foot	[illegible]	The input value represents a conservative material cost per foot of duct for 4" PVC
Manhole investment per manhole	[illegible]	The input value represents the installed cost of a prefabricated concrete manhole, per industry pricing. Exhibit 3 provides a representative estimate of a typical manhole.
Buried cable armoring multiplier	1.1	The armoring multiplier is based on field experience for DEPIC filled ASH sheath cable for all buried cable. A multiplier (rather than an additional cost per foot) is appropriate, since armoring cost is a function of cable circumference, which is a function of number of pairs, which is directly correlated with cost.

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY September 26, 1996

Input Name	Inputs	Support Material
Fiber Feeder Structure Inputs		
'erial Fraction		
-5	0.35	The proportion of the three structure categories of Aerial, Buried and Underground reflect the desired practice of burying fiber to provide added protection from physical exposure to potential damage Ae' a installation of fiber is more difficult to place because of the small diamete of the fiber and the tendency of the fiber to coil. Self-supporting fiber cable is generally not available and the difference in the coefficient of expansion between fiber and the supporting steel strand further complicates aerial structure.
5-200	0.35	
200-650	0.35	
650-850	0.2	
850-2550	0 1	
2550+	0 05	
ɹned Fraction		
0-5	0.6	
5-200	0.6	
200-650	0.6	
650-850	0 6	
850-2550	0.1	
2550+	0.05	
Underground Fraction		
0-5	0.05	
5-200	0.05	The higher proportion of underground in the higher density zones reflects the fact that feeder cable is generally run in conduit in high density areas as previously discussed. This assumption is generally consistent with the assumption in BCM.
0-650	0.05	
ɔ0-850	0.2	
850-2550	0.8	
2550+	0.9	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY   September 26, 1996

Input Name	Inputs	Support Material
Fiber Feeder Structure Inputs (contd.)		
Buried Installation/foot		
0-5	$2.00	Trenching and plowing of cable are less expensive methods of creating paths for the placing of cable underground than is trenching for cable in conduit, which in general involves penetrating pavement and restoring pavement as well as earth excavation and backfill.
5-200	$2.00	The cost per foot of buried installation varies by density class based on the anticipated higher incidence of features obstructions as density increases.
200-650	$2.00	The trenching figures for buried installation represent reasonable estimates for continuous common earth trenching.
650-850	$3.00	
850-2550	$3.00	
2550-	$20.00	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Conduit Installation/foot		
0-5	$25.00	Trenching for cable in conduit is a more expensive method of creating paths for the placing of cable underground than is trenching and plowing of cable which generally involves penetrating pavement and [illegible]
5-200	$25.00	[illegible]
200-650	$25.00	The trenching figures for conduit installation represent reasonable estimates for continuous common earth trenching.
650-850	$25.00	
850-2550	$45.00	
2550+	$70.00	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY September 26, 1996

Input Name	Inputs	Support Material
Fiber Feeder Structure Inputs (contd.)		
Manhole Spacing, ft.		
0-5	2,000	Unlike copper, the manhole spacing for
5-200	2,000	fiber is based on the practice of coiling
200-650	2,000	spare fiber within manholes to facilitate
650-850	2,000	repair in the event the cable is cut not a
850-2550	2,000	function of the cable reel lengths
2550+	[illegible]	
Buried cable armoring per foot, fiber	[illegible]	The armoring estimate for fiber does not vary with size, given that the outside diameter of fiber cable is constant regardless of strand count
Misc. Loop Investment Inputs		
Drop investment per line	$40.00	The Drop investment per line includes $10 for material and $30 for labor and assumes 2-pair per drop.
NID investment per line	$30.00	The NID investment per line includes $15 for material and $15 for labor.
Terminal and splice per line	$35.00	Assumes terminal serves an average of 4 houses totaling $140 split 50/50 labor and materials or $35 per house.
Average lines per business location	4	HAI estimated the Input based on review of statistical abstracts and represents an average of large, medium and small business
Feeder structure fraction shared w/ interoffice	0.25	75% of interoffice facilities have their own structure, leaving assuming 25% of interoffice structure would already be built for feeder.

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Misc. Loop Investment Inputs		
Distribution structure % assigned to telephone		
aerial	0.33	Distribution of Structure % assigned to Telecommunications, CATV, and Power
buried	0.33	
underground	0.33	
Feeder structure % assigned to telephone		Distribution of Structure % assigned to Telecommunications, CATV, and Power
aerial	0.33	
buried	0.33	
underground	0.33	
SAI Investment, installed		The SAI technology has been espoused in engineering principles since the 1970s. It is an integral part of the way one would design a network using today's forward looking technology, as opposed to directly connecting a subscriber with a Central Office Different values are shown depending on distribution cable size. Values were determined during work group sessions and based upon industry knowledge
Distribution cable size	*copper feeder*	
0	$500.00	
100	$700.00	
200	$900.00	
400	$1,100.00	
600	$1,300.00	
900	$1,500.00	
1200	$1,700.00	
1800	$1,900.00	
2400	$2,100.00	
3000	$2,300.00	
3600	$2,500.00	

Input Name	Inputs	Support Material
Misc. Loop Investment Inputs		
Distribution cable size	*fiber feeder*	
[illegible]	$2,500.00	The SAI technology has been espoused in engineering principles since the 1970s. It is an integral part of the way one would design a network using today's forward looking technology looking forward as opposed to directly connecting a subscriber with a Central Office.
100	$2,700.00	
200	$2,900.00	
400	$3,100.00	
[illegible]	$3,300.00	
[illegible]	$3,500.00	Different values are shown depending on distribution cable size. Values were determined during work group sessions and base upon industry knowledge.
[illegible]	$3,700.00	
[illegible]	$3,900.00	
[illegible]	$4,100.00	
[illegible]	$4,300.00	
[illegible]	$4,500.00	The Fiber feeder values include site housing and account for the $2,000 difference between copper and fiber and reflect the costs for a concrete pad and cabinet.
Digital Loop Carrier Inputs		
SLC TR-303		
Site, housing and power per remote terminal	$3,000.00	Site, housing and power per remote terminal must be added to the investment in the SAI set-up costs. The default value is intended to include the amount for common cards associated with establishing 672 line bays in the remote terminal. Exhibit 4 illustrates the various components involved in the Digital Loop Carrier.
Maximum lines	672	Assumption based on common industry knowledge.

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY September 26, 1996

Input Name	Inputs	Support Material
Digital Loop Carrier Inputs (contd.)		
Remote terminal fill factor	0.9	The 90% utilization for Integrated Digital Loop Carrier is based on 90% utilization of individual line cards. Whereas the reinforcement of copper cable might take a 9 month cable placement and construction job, fiber/DLC is reinforced by dispatching a technician with additional line cards Since the preponderance of investment in fiber/DLC is not in the inexpensive fiber cable, but in the portable electronics, there is no reason why a telecommunications carrier cannot operate with at least 90% line card utilization.
Common equipment investment	$42,000.00	The Input value provides for a fiber optic multiplexer, sized for OC-3, or 155Mb/s, which can support a maximum of 84 DS-1s that can serve 2,016 POTS lines on 4 fibers
Channel unit investment per line	$75.00	HAI assumption.
DS-0s per fiber	2,016	Assumption based on common industry knowledge.
Fibers per remote terminal	4	Assumption based on common industry knowledge.
AFC		
Site, housing, and power per remote terminal	$2,500.00	Based on publicly available pricing and specifications from AFC.
Maximum lines	100	
Remote terminal fill factor	0.9	
Common equipment investment	$10,000.00	
Channel unit investment per line	$150.00	
DS-0s per fiber	2,016	
Fibers per remote terminal	4	
Fiber feeder distance threshold, ft. (feeder length)	9,000	Industry standard of 9,000 includes only distance for Feeder not entire loop, supported by past field experience.

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Signaling Parameters		
STP Link Capacity	720	AT&T Capacity Cost Study.
STP Maximum Fill	0.8	
STP Investment, per pair, fully equipped	$5,000,000	
STP common equipment investment, per pair	$1,000,000	
Link Termination, both ends	$900	
Signaling Link Bit Rate	56,000	
Link Occupancy	0.4	
C Link Cross-Section	24	
ISUP messages per interoffice BHCA	6	
ISUP message length, bytes	25	
TCAP messages per transaction	2	
TCAP message length, bytes	100	
Fraction of BHCA requiring TCAP	0.1	
SCP investment per transaction per second	$20,000	
Miscellaneous Inputs		
Operator position parameters		
Investment per position	$3,500.00	Typical price for high-end PC.
Maximum utilization per position, CCS	27	Based on 27.5 maximum utilization figure.
Operator intervention factor	10	HAI estimate.
Operator position remote distance, mi.	0	Model option not used.
Other		
DS0/DS1 crossover	24	Assumption based on industry common knowledge.
DS1/DS3 crossover	28	Assumption based on industry common knowledge.
Public Telephone investment per station	$1,200.00	Derived from 1993 New Hampshire Incremental Cost Study, Manchester, NH, April 3, 1993.

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Transport Investment		
Terminal Investment		
Number of Fibers	24	Typical Fiber cross section
FOT capacity, DS-3s	12	HAI assumption
FOT fill	[illegible]	HAI assumption
FOT, installed	$[illegible]	Assumes $[illegible] per OC-48 plus $[illegible] for installation
Pigtails	$[illegible]	[illegible]
Panel	$[illegible]	Estimated cost of non-electronic portion of fiber patch panel
EF&I, per hour	$[illegible]	Determined during discussions between Hatfield, AT&T and MCI
EF&I units	[illegible]	Determined during discussions between Hatfield, AT&T and MCI
Medium Investment		
Fraction of structure assigned to telephone	0.33	Determined during discussions between Hatfield, AT&T and MCI
Fraction of structure shared with feeder	0.25	Determined during discussions between Hatfield, AT&T, and MCI.
Distance, mi	41	Assumption to ensure regeneration with 40 mile spacing
Regenerator spacing, mi	40.00	Based on field experience of maximum distance before fiber regeneration necessary
Regenerator investment, installed	$15,000.00	Indication of equipment price received during Supercomm 96

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY

September 26, 1996

Input Name	Inputs	Support Material
Transport Investment (contd.)		
Medium Investment		
Fiber Cable investment per foot	$2.00	Based on assumed 24 fiber cable. Unit cost is slightly higher than feeder fiber cost to account for additional testing and splice remakes to assure fiber will have low loss associated with long distance
Placement	[illegible]	Same value as for fiber feeder
Splice Spacing, ft.	[illegible]	Estimate based on fact that [illegible] foot pulls are routine [illegible]
Splice Cost	[illegible]	[illegible] assumption
Trenching per foot Resurfacing per foot	[illegible] [illegible]	Composite of various terrains traversed by buried and underground structures
Conduit per foot Number of tubes	[illegible] [illegible]	Input value provides for an additional maintenance duct and concrete reinforcement where deemed necessary for additional protection of the interoffice cable
Manhole investment	$5,000.00	Based on investment in fiberglass pull boxes.
Manhole spacing	1,000.00	Based on a need to provide for spare cable storage to permit pulling of spare cable to repair breaks.
Buried installation per foot	$5.00	Assumes longer cable pulls and concrete reinforcements where necessary for additional protection
Pole investment	450	The input value represents a conservative installed cost for a 35' Class 4 treated southern pine pole. The cost is split approximately 40/60 material to labor and assumes installation by high production machinery such as power auger trucks.
Pole spacing	150	Pole spacing is based on field experience of 35 poles per mile.
Underground percent	35.00%	Assume that majority of transport fiber will be underground, protected from the elements.
Buried percent	50.00%	
Aerial percent	15.00%	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY   September 26, 1996

Input Name	Inputs	Support Material
Call Attempts & DEMs		
Call Attempts		
Local	[illegible]	Reported to the FCC by LEC in ARMIS data.
IntraLata Intrastate	1,746,552,000.00	
InterLata Intrastate	[illegible]	
InterLata Interstate	[illegible]	
Call Completion Fraction	[illegible]	Determined during discussions between Hatfield, AT&T, and MCI
DEMs		
Local	[illegible]	Reported to the FCC by LEC in ARMIS data.
Intrastate	[illegible]	
Interstate	[illegible]	
Local bus/res DEMs	[illegible]	Determined during discussions between Hatfield, AT&T, and MCI
Intrastate bus/res DEMs	[illegible]	Determined during discussions between Hatfield, AT&T, and MCI
Interstate bus/res DEMs	[illegible]	Determined during discussions between Hatfield, AT&T, and MCI.
Line Counts		
Residential	[illegible]	Reported to the FCC by LEC in ARMIS data.
Business	[illegible]	
Special Access	[illegible]	
Public	[illegible]	

Input Name	Inputs	Support Material
Cable Costs		
Feeder		
Jnderground		
Cable Size	Cost UG	
4200	74.25	Material value of copper is approximately 40% of the total installed cost, engineering represents [illegible]
3600	63.75	
3000	53.25	
2400	[illegible]	
1800	[illegible]	
200	[illegible]	
900	[illegible]	
600	[illegible]	
400	[illegible]	
200	4.25	
100	[illegible]	[illegible]
Aenal		
Cable Size	Cost Aerial	
4200	[illegible]	
3600	63.75	
3000	53.25	
400	42.75	
300	32.25	
1200	21.75	
900	16.5	
600	11.25	
400	7.75	
200	4.25	
100	2.5	

HATFIELD MODEL V.2.2.2 - INPUT SUMMARY   September 26, 1996

Input Name	Inputs	Support Material
Cable Costs (contd.)		
Distribution		
Underground		
Cable Size	Cost UG	
3600	63.75	Material value of copper is approximately 40% of the total installed cost. engineering represents 15% and the remaining 45% is attributed to installation and splicing of cable. Values determined from work group sessions and industry knowledge including past field experience
3000	53.25	
2400	42.75	
1800	32.25	
1200	21.75	
00	16.5	
600	11.25	
400	7.75	
200	4.25	
100	2.5	
50	1.625	Additional support illustrating the linear relationship of cost per foot of copper cable to cable size (number of pairs) is depicted in Exhibit 5
25	1.19	
Aerial		
Cable Size	Cost Aerial	
3600	63.75	
3000	53.25	
100	42.75	
00	32.25	
1200	21.75	
900	16.5	
600	11.25	
400	7.75	
200	4.25	
100	2.5	
50	1.625	
25	1.19	

Input Name	Inputs	Support Material
Cable Costs (contd.)		
Fiber		
Underground		
Cable Size	Cost UG	
216	13.1	Material cost of $.30 per foot plus $.05 per fiber per foot plus $2.00 installation cost per foot Values determined from workgroup sessions and industry knowledge including past field experience.
144	9.5	
96	7.1	
72	5.9	
60	5.3	
	4.7	
36	4.1	
24	3.5	
18	3.2	
12	2.9	
Aerial		
Cable Size	Cost Aerial	
216	13.1	
144	9.5	
96	7.1	
72	5.9	
	5.3	
	4.7	
36	4.1	
24	3.5	
18	3.2	
12	2.9	

State of Texas
County of Dallas:

EXHIBIT C

AFFIDAVIT OF ROGER WHITE

I, Roger White, depose and say the following:

1. I am Section Manager, Cost Models and Methods, GTE Telephone Operations. In discharge of my duties I have examined Hatfield 3.0.

2. Based on reasonable engineering assumptions applied to the sparse data on cable placement offered by Hatfield 3.0 -- which does not provide any indication of on what basis the relevant calculations were made -- a fair estimate is that the Hatfield default inputs fall in a range 30% to 40% lower than the mid-point of GTE's contract prices for cable placement in California with AT&T for the contract that expired December 31, 1995. The gap would be still greater in a locale where there were rocky soil conditions. AT&T (this business later passed to Lucent) declined to bid for an add-on contract, evidently because the pricing was too low to represent profitable business.

Roger White

Sworn to before me this 24 day of February, 1997

Sharon E. Longman
Notary Public

SHARON E. LONGMAN
Notary Public, State of Texas
My Commission Expires
SEPTEMBER 29 2000

Certificate of Service

I, Ann D. Berkowitz, hereby certify that copies of the foregoing "GTE's Reply Comments" have been mailed by first class United States mail, postage prepaid, on February 24, 1997 to all parties on the attached list.

Ann D. Berkowitz

Richard N. Clarke
AT&T Corporation
295 North Maple Avenue
Room 5462C2
Basking Ridge, NJ 07920

David Cosson
National Telephone Cooperative
2626 Pennsylvania Avenue, NW
Washington, DC 20037

Joseph Di Bella
NYNEX Telephone Companies
1300 I Street, NW
Suite 400 West
Washington, DC 20005

Chris Frentrup
MCI Telecommunications Corporation
1801 Pennsylvania Avenue, NW
Washington, DC 20006

Margaret E. Garber
Pacific Telesis Group
1275 Pennsylvania Avenue, NW
Washington, DC 20004

Hance Haney
United States Telephone Association
1401 H Street, NW
Suite 600
Washington, DC 20005

Darryl W. Howard
Southwestern Bell Corporation
One Bell Center
Suite 3524
St. Louis, MO 63101

Margot Smiley Humphrey
Koteen & Naftalin
1150 Connecticut Avenue, NW
Suite 1000
Washington, DC 20036

Robert A. Mazer
Vinson & Elkins
1455 Pennsylvania Avenue, NW
Suite 700
Washington, DC 200041008

Robert B. McKenna
U S West Communications, Inc.
1020 19th Street, NW
Suite 700
Washington, DC 20036

Vicki Oswalt
Texas Public Utility Commission
1701 North Congress Avenue
P.O. Box 13326
Austin, TX 78711

Larry A. Peck
Ameritech Operating Companies
2000 West Amertech Center Drive
Room 4H86
Hoffman Estates, IL 601961025

Richard M. Sbaratta
BellSouth Corporation
1155 Peachtree Street
Suite 1700
Atlanta, GA 303093610

Mark Sievers
Swidler & Berlin, Chartered
3000 K Street, NW
Suite 300
Washington, DC 20007

Sarah R. Thomas
Pacific Telesis Group
140 New Montgomery Street
Room 1522A
San Francisco, CA 94105

Donn T. Wonnell
Pacific Telecom, Inc.
805 Broadway
Vancouver, WA 98660

Michael S. Wroblewski
Latham & Watkins
1001 Pennsylvania Avenue, NW
Suite 1300
Washington, DC 20004

Lisa M. Zaina
OPASTCO
21 Dupont Circle, NW
Suite 700
Washington, DC 20036